REMARKS

Reconsideration of this application is respectfully requested.

Amended claim 1 is a combination of original claim 1 and original claim 2, while amended claim 7 is a combination of original claim 7 and original claim 8.

Claims 23-27 have been rejected under 35 USC 112, second paragraph, as being indefinite for the reasons given in Section 5 of the Office Action. The amendment kindly suggested by the Examiner has been adopted so as to overcome this objection.

Claims 1, 3-4, 7, 9-10, 23, and 26 have been rejected under 35 USC 102(b) as anticipated by Tanaka et al. (EP 0520667A1).

Claims 1, 2, 4-5, 7, 8, 10-11, and 23 have been rejected under 35 USC 102(b) as being anticipated by Miyabayashi et al. (EP 0549802A1).

Claims 1 and 7 have been rejected under 35 USC 102(b) as being anticipated by Mitsutaka et al. (JP 5-94838, abstract).

Claims 1, 5, 7, 11, and 23 have been rejected under 35 USC 102(b) as being anticipated by JP 6-267531 (abstract).

Claims 1, 7, 23, 25, and 27 have been rejected under 35 USC 102(b) as being anticipated by Tanaka et al. (USP 5,344,726).

Claims 1-2, 5, 7-8, and 11 have been rejected under 35 USC 102(a) as being anticipated by JP 8-104510 (abstract).

Claims 6 and 12 have been rejected under 35 USC 103(a) as being unpatentable over Miyabayashi et al.

Each of these rejections insofar as applicable to the newly amended claim is respectfully traversed.

The invention is characterized in that the carbon material of the invention has (i) a nearly spheric or ellipsoidal shape and (ii) a specific surface area determined by a BET method of 5 m^2/g or less.

Furthermore, the invention is characterized in that the carbon material is produced by washing a core carbon material coated with a coat-forming carbon material to prevent aggregation of carbon material, in particular, after calcination.

As shown on page 4 lines 11-21 of the specification, covering (core) graphite particles with amorphous carbon derived from decomposed organic compounds by calcination results in fused and aggregated carbon particles. When the fused and aggregated carbon particles are powdered, powdered particles have an active (not coated) surface of (core) graphite which is likely to react with electrolyte.

The coat-forming carbon material includes tar and pitch. Tar and pitch have a broad molecular weight distribution from lower molecular weight components (soluble matter) to higher molecular weight components (insoluble matter). The higher molecular weight components are not sticky and do not cause aggregation or fusing of carbon material after carbonization, in particular, calcination. However, core carbon material can not be coated with only higher molecular weight components but with tar or pitch containing both lower and higher molecular weight components, since higher molecular weight components have substantially no flow properties. Higher molecular weight components have

a softening temperature higher than the boiling point of organic solvent. Therefore, higher molecular weight components have no flow properties in the presence of organic solvent.

In contrast, tar and pitch have suitable flow properties based on lower molecular weight components. Lower molecular weight components are necessary to cover core carbon material with higher molecular weight components to impart flow properties. However, lower molecular weight components should be removed from the coating layer since lower molecular weight components are sticky and cause fusing or aggregation.

When organic solvent is added to tar or pitch, solvent layer containing lower molecular weight components (soluble matter) and higher molecular weight components layer (insoluble matter) are separated. Therefore, core carbon material cannot be suitably coated when dipped in a two-phase mixture of organic solvent and tar or pitch.

For example, Miyabayashi et al. disclose a method for covering a core material with a mixture of solvent and organic compound (page 7, lines 34-38) which fails to suitably cover a core carbon material with tar or pitch.

To coat a core carbon material with higher molecular weight component of tar or pitch for the purpose of generating a two-layer carbon material without aggregation and fusing can only be conducted by coating a core carbon material with tar or pitch, followed by washing the coated carbon material with organic solvent.

Active surface of carbon material is generated by pulverization of aggregated or fused carbon material. The nearly spheric or ellipsoidal carbon material can not be produced without the washing process, since pulverization causes cracking of carbon material resulting in neither spheric nor ellipsoidal carbon material.

In contrast, as shown in examples of the specification, particle size distribution of the carbon material of the invention prepared without pulverization is similar to that of core material. Furthermore, the core material of the invention is round according to the results of SEM observation (see examples).

In order to inhibit fusing and aggregation of carbon material, according to the invention, carbon material coated with heavy oil is washed with organic solvent. This washing procedure is very important for inhibition of fusing and aggregation of carbon material after calcination. None of the references disclose the washing step.

In addition, the specific surface area of the carbon material of the invention is smaller than core carbon material showing that pores concerning specific surface area determined by a BET method are filled by adhesion or coating thereto of carbon derived from heavy oil, and the carbon materials have a specific surface area of 5 m^2/g (page 5, line 20 to page 6, line 11 of the specification). As shown below, specific surface area is decreased by covering core material with heavy oil.

	Specific Surface Area (m^2/g)		
	Core material	Two layer carbon material	
		Before Calcination	After Calcination
Example 1	10.8	4.0	3.6
Example 6	10.8	4.0	3.4
Example 9	10.8	3.7	3.3
Example 10	10.8	4.1	3.7
Example 11	10.8	3.3	2.6
Example 12	10.8	4.5	4.1
Example 13	10.8	4.2	3.9
Example 14	3.0	3.0	2.8
Example 15	14.4	2.1	1.9
Example 16	6.8	2.8	2.5
Example 17	9.2	2.6	2.2
Example 18	13.5	2.6	2.4
Example 19	10.8	3.1	2.3
Example 20	10.8	3.9	3.2
Example 21	10.8	4.8	4.3
Example 22	10.8	4.2	4.4
Example 24	10.8	4.5	4.1

As shown above, the carbon materials of the invention have a specific surface area of less than 5.0 m^2/g, and measured values of specific surface area are decreased before and after calcination except for example 14.

Furthermore, when the content of particles with a diameter of 1 μm is more than 10% based on volume thereof, battery properties are decreased due to increase of specific surface area (see, page 17, lines 4-8 of the specification).

Tanaka et al. '667 disclose carbon active material which has a core structure with high crystallinity covered with an amorphous carbon. However, Tanaka et al. '667 do not disclose a specific surface area of the carbon active material. In addition, the core carbon is covered with amorphous carbon derived from decomposed hydrocarbon such as propane (example 1) in a vapor phase reaction. Although a liquid phase process for covering graphite particles with tar or pitch is disclosed (on page 5, lines 2-3 of Tanaka et al. '667, column 5 lines 24-27 of USP 5,344,726), specific reaction conditions about liquid phase process for covering graphite particles, in particular washing process, are not disclosed.

In example 1 of Tanaka et al. '667, vapor phase reaction using propane or other hydrocarbons is disclosed to cover core graphite with amorphous carbon. With respect to the vapor phase reaction procedure, when the amount of deposited amorphous carbon is small, the surface of core carbon material can not be fully covered with amorphous carbon resulting in more than 5 m^2/g of specific surface area due to uncovered edge parts of core carbon material. When the amount of deposited amorphous carbon is large, although surface of core carbon material can be fully covered with amorphous carbon, fine carbon particles (soot) are generated, resulting in more than 5 m^2/g of specific surface area.

With respect to the liquid phase process of the invention without pulverization, edge parts of core carbon material are completely covered with amorphous carbon with no generation of soot, resulting in less than 5 m^2/g of specific surface area.

Accordingly, Tanaka et al. '667 do not teach or suggest the claimed invention.

Miyabayashi et al. disclose carbonaceous material which has a multi-layer structure comprising surface layer and nucleus (page 2, lines 49-50).

Miyabayashi et al. disclose a covering process in vapor, liquid and solid phase (see, page 7, line 26 to page 8, line 17). As shown above, the vapor phase process has a drawback of insufficient deposition of amorphous carbon on nucleus or increased specific surface area due to generation of soot. Liquid or solid phase processes have a drawback of fusing or aggregation of nucleus after carbonization or calcination resulting in generation of an active surface of core carbon material during the pulverization process, the active surface of which is likely to react with electrolyte. The pulverization process is disclosed on page 13, lines 52-53 of Miyabayashi et al.

The same drawbacks are present in Mitsutaka et al., JP-6-267531, and JP-8-104510.

In addition, none of the references teach or suggest a washing process.

Miyabayashi et al. disclose a method for covering a core material with a mixture of solvent and organic compound (page 7, lines 34-38) which fails to suitably cover a core carbon material with tar or pitch. In example 4 (page 13, lines 45-59), pitch is dissolved in a solvent. In this case, suitable coating cannot be conducted.

For the reasons given above, it is clear that the cited references fail to either disclose or suggest the claimed invention. Favorable action is respectfully requested.

Respectfully submitted,

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Date: March 16, 2000

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